

Table S1. Isotherms equations and constants for chromium ions adsorption onto commercial and commercial grafted chitosan.

		Commercial chitosan		Commercial grafted chitosan	
	Equation	R ²	Parameters	R ²	Parameters
Freundlich	$q_e = K_F(C_e)^{1/n}$	0.998	$K_F = 1.77 \text{ mgg}^{-1}$ $1/n = 0.665$	0.989	$K_F = 2.16 \text{ mgg}^{-1}$ $1/n = 0.7621$
Langmuir	$q_e = (q_m K_L C_e) / (1 + K_L C_e)$	0.998	$q_m = 14.95 \text{ mgg}^{-1}$, $K_L = 0.1189 \text{ L mg}^{-1}$	0.998	$q_m = 22.94 \text{ mgg}^{-1}$, $K_L = 0.0996 \text{ L mg}^{-1}$
Temkin	$q_e = q_m \ln(K_T C_e)$	0.965	$q_m = 3.187 \text{ mgg}^{-1}$, $K_T = 1.29 \text{ L mg}^{-1}$	0.982	$q_m = 6.34 \text{ mgg}^{-1}$, $K_T = 1.68 \text{ L mg}^{-1}$
Dubinin-Radushkevich	$q_e = q_m \exp(-D\varepsilon^2)$ that $\varepsilon = RT \ln(1 + C_e - 1)$	0.865	$q_m = 7.03 \text{ mgg}^{-1}$, $K_D = 9.91 \cdot 10^{-3} \text{ mol}^2 \text{ J}^{-2}$ $E = 7.10 \text{ KJ mol}^{-1}$	0.921	$q_m = 7.8 \text{ mgg}^{-1}$, $K_D = 9.19 \cdot 10^{-3} \text{ mol}^2 \text{ J}^{-2}$ $E = 23.41 \text{ KJ mol}^{-1}$

Table S2. Isotherms equations and constants for chromium ions adsorption onto natural and natural grafted chitosan.

		Natural chitosan		Natural grafted chitosan	
	Equation	R ²	Parameters	R ²	Parameters
Freundlich	$q_e = K_F(C_e)^{1/n}$	0.9965	$K_F = 1.73 \text{ mgg}^{-1}$ $1/n = 0.64$	0.9482	$K_F = 2.26 \text{ mgg}^{-1}$ $1/n = 0.6344$
Langmuir	$q_e = (q_m K_L C_e) / (1 + K_L C_e)$	0.9967	$q_m = 11.73 \text{ mgg}^{-1}$, $K_L = 0.157 \text{ L mg}^{-1}$	0.9566	$q_m = 16.83 \text{ mgg}^{-1}$, $K_L = 0.137 \text{ L mg}^{-1}$
Temkin	$q_e = q_m \ln(K_T C_e)$	0.9586	$q_m = 2.59 \text{ mgg}^{-1}$ $K_T = 1.4 \text{ L mg}^{-1}$	0.9508	$q_m = 7.33 \text{ mgg}^{-1}$ $K_T = 1.96 \text{ L mg}^{-1}$
Dubinin-Radushkevich	$q_e = q_m \exp(-D\varepsilon^2)$ that $\varepsilon = RT \ln(1 + C_e - 1)$	0.8633	$q_D = 6.73 \text{ mgg}^{-1}$, $K_D = 1.35 \cdot 10^{-3} \text{ mol}^2 \text{ J}^{-2}$ $E = 19.3 \text{ KJ mol}^{-1}$	0.9555	$q_D = 6.72 \text{ mgg}^{-1}$, $K_D = 0.001 \text{ mol}^2 \text{ J}^{-2}$ $E = 22.36 \text{ KJ mol}^{-1}$

Table S3. ANOVA results for Cr⁺⁶ removal (%) using CC.

Source	Sum of Square	df	Mean of Square	F-Value	p-Value	Significant or insignificant model terms
Model	4589.243	3	1529.748	11.13807	0.002196	Significant
X₁	37.802	1	37.802	22.507	0.005131	Significant
X₂	554.653	1	554.653	330.246	0.000009	Significant
X₃	4143.213	1	4143.213	2466.910	0.000000	Significant
X₁²	376.280	1	376.280	224.041	0.000024	
X₂²	144.996	1	144.996	86.332	0.000243	
X₃²	699.055	1	699.055	416.224	0.000005	
X₁X₂	1.124	1	1.124	0.669	0.450604	
X₁X₃	0.286	1	0.286	0.170	0.696844	
X₂X₃	47.239	1	47.239	28.127	0.003183	
Error	8.398	5	1.680			
Total SS	6527.551	14				

Table S4. ANOVA results for Cr⁺⁶ removal (%) using GCC.

Source	Sum of Square	df	Mean of Square	F-Value	p-Value	Significant or insignificant model terms
Model	4381.360	3	1460.453	12.29906	0.000775	Significant
X₁	2.247	1	2.247	1.303	0.305355	
X₂	226.976	1	226.976	131.616	0.000088	Significant
X₃	3175.683	1	3175.683	1841.482	0.000000	Significant
X₁²	80.774	1	80.774	46.838	0.001017	
X₂²	62.948	1	62.948	36.502	0.001790	
X₃²	914.183	1	914.183	530.107	0.000003	
X₁X₂	0.221	1	0.221	0.128	0.735030	
X₁X₃	0.008	1	0.008	0.005	0.948017	
X₂X₃	1.676	1	1.676	0.972	0.369478	
Error	8.623	5	1.725			
Total SS	5687.556	14				

Table S5. ANOVA results for Cr⁺⁶ removal (%) using NC.

Source	Sum of Square	df	Mean of Square	F-Value	p-Value	Significant or insignificant model terms
Model	5285.499	3	1761.833	12.61862	0.000697	Significant
X₁	32.160	1	32.160	22.975	0.004913	Significant
X₂	591.676	1	591.676	422.681	0.000005	Significant
X₃	4420.580	1	4420.580	3157.973	0.000000	Significant
X₁²	371.309	1	371.309	265.256	0.000016	
X₂²	186.711	1	186.711	133.383	0.000085	
X₃²	674.505	1	674.505	481.853	0.000004	
X₁X₂	0.018	1	0.018	0.013	0.913596	
X₁X₃	0.007	1	0.007	0.005	0.945512	
X₂X₃	51.390	1	51.390	36.712	0.001767	
Error	6.999	5	1.400			
Total SS	6821.338	14				

Table S6. ANOVA results for Cr⁺⁶ removal (%) using GCC.

Source	Sum of Square	df	Mean of Square	F-Value	p-Value	Significant or insignificant model terms
Model	4144.071	3	1381.357	10.95417	0.001244	Significant
X₁	44.368	1	44.368	5.9268	0.059052	
X₂	477.228	1	477.228	63.7493	0.000497	Significant
X₃	3179.685	1	3179.685	424.7505	0.000005	Significant
X₁²	164.109	1	164.109	21.9222	0.005423	
X₂²	66.550	1	66.550	8.8900	0.030743	
X₃²	797.403	1	797.403	106.5191	0.000147	
X₁X₂	1.000	1	1.000	0.1336	0.729699	
X₁X₃	2.496	1	2.496	0.3335	0.588647	
X₂X₃	51.654	1	51.654	6.9000	0.046714	
Error	37.430	5	7.486			
Total SS	5531.208	14				